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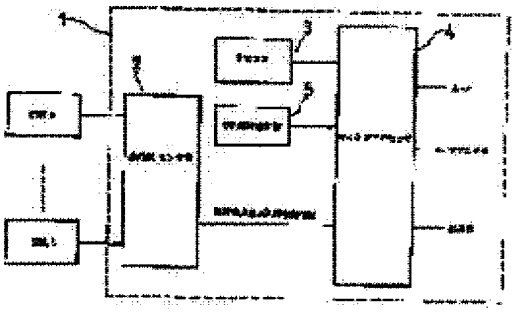
(54) AIR CONDITIONING SYSTEM

(57)Abstract:
PURPOSE: To provide an air conditioning system which can control the temperature at every area of room by detecting the number of people and their moving area and controlling the direction of a louver and the amount of air according to the detected state.
CONSTITUTION: In an air conditioning system for conditioning indoor air, the number of people and their moving area are detected at the sensing section 2 of an air conditioner 1 and temperature at every area of room is controlled by adjusting the amount of air forced by a room blower according to the detected state. Furthermore, swing of a louver is adjusted according to the movement state of people so as to make users feel a comfortable air conditioning environment at every area of room.



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CLAIMS

[Claim(s)]
[Claim 1] In the control approach of the air conditioner which performs indoor air harmony so that whenever [room air temperature] may be sensed, this sensed temperature and the set-up temperature may be measured and laying temperature may be approached The phase of detecting radiation temperature while classifying an indoor field into the predetermined section and supervising the section one after another between predetermined time, The phase of judging whether the temperature gradient of the temperature sensed in said temperature sensing phase and whenever [room air temperature] having been searched for, it having judged whether this temperature gradient having been beyond predetermined temperature, and it having been more than predetermined radiation temperature, and the location of the body and indoor field temperature sensing having been completed, The control approach of the air conditioner which consists of a phase of judging the temperature gradient of whenever [room air temperature], and laying temperature, and judging the existence of the body, a phase which controls the direction and airflow of said louver by the comparison with the temperature of a body detection area, and the temperature of a body adjoining land region.
[Claim 2] The control approach of an air conditioner which becomes in the phase which senses the adjoining field temperature of the field where whenever [room air temperature], and remote-control laying temperature were measured, and the body has been sensed when whenever [room air temperature] is low when the phase and detection field section sensing which judges where the detection field section is will not be completed in the 1st term, if an indoor body location is judged, and is made carrying out swing jazz at the adjoining section as compared with predetermined temperature.
[Claim 3] The control approach of the air conditioner which controls the airflow and wind direction which will weak-operate an indoor blower fan if whenever [room air temperature] is low and the body is not detected in the 1st term, and carry out a louver perpendicularly.
[Claim 4] The control approach of the air conditioner which measures remote control laying temperature and whenever [room air temperature], will set the direction of a louver as an adjoining field in the 1st term if whenever [room air temperature] is high, a louver is horizontally carried out to it being decision that there is no body, whenever [room air temperature] is high and the body is detected in a detection area, and controls airflow and wind direction.
[Claim 5] In the control approach of the air conditioner which performs indoor air harmony so that whenever [room air temperature] may be sensed, this sensed temperature and the set-up temperature may be measured and laying temperature may be approached The phase which senses nothing [human-body-presence] indoor and an indoor migration condition, and computes the temperature gradient of whenever [room air temperature], and the radiation temperature by body sensing, In the phase of measuring the temperature gradient and radiation temperature which were computed in the above-mentioned temperature calculation phase, and deciding the temperature and the body location of a radiation object, and the above-mentioned body location decision phase The control approach of an air conditioner which consists of a phase which may be carried out by the number of the sensed field and the bodies in the directional control of a louver, and the air-flow rate control of a blower fan.

[Claim 6] The control approach of an air conditioner which judges a body detection field and the count of detection, judges the number of the bodies, judges temperature when the detected number of the bodies is 1, and serves as an indoor fan engine speed from the phase which controls a louver hand of cut in the 5th term.
[Claim 7] The control approach of an air conditioner which consists of a phase of making it carrying out the swing jazz of the louver hand of cut when the number of the bodies is judged to be two or more after setting an initial guide and the last guide as the location of the body, in the 6th term.
[Claim 8] In the air conditioner which carries out guidance air conditioning so that whenever [room air temperature] may be sensed, this sensed temperature and the set-up temperature may be measured and laying temperature may be approached A sensing means vertically and horizontally movable in order to sense the radiant ray which divides an indoor field at the predetermined section and is emitted from the body, The air-conditioning system possessing the control means which controls so that said sensing means moves according to the predetermined section, judges the body's existence **** and migration existence, and controls the engine speed of an indoor blower fan and the migration direction of a louver, and operation of a compressor on the basis of this.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the control approach of the air conditioner which controls wind direction and airflow appropriately according to existence of the body and a migration field indoors, and enabled it to make comfortable indoor air harmony especially about an air-conditioning system.
[0002]
[Description of the Prior Art] The temperature gradient of laying temperature and detection temperature is detected so that air conditioning may be carried out according to an indoor load effect in the conventional air conditioner, and indoor airflow and a compressor are controlled until temperature resembles the set point defined according to this detected temperature gradient.
[0003] However, the air-conditioning effectiveness over the body had an un-**** trouble on the relation which judges an indoor load effect only with inhalation air simply in the conventional air conditioner, and carries out the whole indoor air conditioning, and indoors, since air-conditioning is made nothing with regards to a resident's location, in order to sense the air-conditioning condition of a suitable condition, it had to wait for a long time.
[0004] in order to solve such a problem -- Japanese patent public presentation official report **** No. 79532 [64 to] -- the wind direction of an air conditioner -- the thing about offering the control approach and equipment is shown.
[0005] The detection means 1 which becomes with the infrared sensor in which this patent has two or more directivity, the detection signal magnification means 2, a comparison means 4 to compare a magnification signal, and wind direction -- with the control aerofoil 13 The control driving means 11 is provided. a judgment means 10 to judge a body location therefore to the output of a comparison means, and wind direction -- or it detects the infrared radiation emitted from the body, and the section where the location of the body and distribution of the body are large, or the body does not exist (when it is a chiller) -- the section (when it is a heater) where ensemble distribution is small -- the other side -- since a louver is driven like and wind direction is controlled, a comfortable air conditioning is made.
[0006]
[Problem(s) to be Solved by the Invention] In this case, since effective air-conditioning which follows for an area with the body to become higher than indoor laying temperature since that purpose is to control a louver drive so that it may depend on many body sensing means and wind direction may be guided according to people's existence existence was not made, it had changed into the condition that an air-conditioning condition cannot be sensed good for those who are actually indoors.
[0007]
[Objects of the Invention] The purpose of this invention is to offer the air-conditioning system which senses nothing [human-body-presence] indoor and an indoor migration field, controls wind direction and airflow according to this condition of having been sensed, and controls the temperature of the indoor whole region. Other purposes of this invention are to offer the air-

conditioning control approach of the air conditioner which senses the body's existence existence and a migration condition, and controls the migration direction of a louver, and compressor operation of an indoor blower fan according to each section, moving the sensing means which becomes with an infrared sensor according to the predetermined field section. The control approach of the air conditioner which senses the body existence existence of the interior of a room [purpose / one] again of this invention and a migration condition, and controls the temperature of the indoor whole region effectively is offered. Other purposes of this invention are again to offer the control approach of an air conditioner that it enabled application of nothing [human-body-presence] and a migration field to a heater as air conditioning to the indoor whole region split and was made.

[0008] In order to sense the radiant ray emitted from the body, dividing an indoor field at the predetermined section in order to attain such a purpose, it consists of microprocessors which control so that a movable sensing means and said sensing means move according to the predetermined section vertically and horizontally, judge the body's existence **** and migration existence, and control operation of the rotational frequency of an indoor blower fan, the migration direction, and a compressor on the basis of this.

[0009] The air-conditioning control approach of this invention which becomes with such a configuration The phase which divides an indoor field at the predetermined section and senses temperature between predetermined time, The phase of judging whether the location of the body and indoor field sensing having been completed after judging whether the temperature gradient of whenever [room air temperature], the temperature sensed in said temperature sensing phase and being searched for, this temperature gradient being beyond predetermined temperature, and it being more than predetermined radiation temperature, After judging the temperature gradient of whenever [room air temperature], and indoor laying temperature, it consists of phases which control the direction of said louver, and the airflow of a blower fan by the comparison with the temperature of a body sensing area, and predetermined temperature according to nothing [human-body-presence].

[0010] Moreover, the temperature calculation phase which senses nothing [human-body-presence] and a migration condition, and computes a temperature gradient as other approaches of this invention again by subtraction with whenever [room air temperature], and the radiation temperature according to body sensing, It is characterized by making it controlled by the control phase to be able to make the directional control and air-flow rate control of a louver according to the number of the field sensed in the body location decision phase of judging the location of radiation temperature and the body according to the condition of having been computed in said temperature calculation phase, and said body location decision phase, and men.

[0011]

[Example] It is as follows, if it depends on the attached drawing hereafter and this invention is explained to a detail. Drawing 1 is an instantiation Fig. showing the process in which the infrared sensor of the air conditioner applied to this invention senses an indoor field. An air conditioner 1 possesses the infrared sensor 2, and the infrared sensor 2 is installed so that an indoor field may be equally divided into 12 and may be sensed sequential to predetermined section A-L.

[0012] Drawing 2 is the control-block Fig. of the air-conditioning system applied to this invention. The sensing signal which senses whenever [indoor number of the bodies, existence / of the body / and room air temperature], and corresponds to this condition of having been sensed, Namely, the existence of the body, the number of the bodies, the migration condition signal of the body, Whenever [room air temperature] and a signal Whenever [infrared sensor / which is made to output / 2 and :room air temperature] the remote control section 3 which inputs operation mode, indoor laying temperature, etc. under air conditioning of a sensor 5 and :air conditioner, and heating whenever [room air temperature / to sense], and : -- the signal inputted from a sensor 5 whenever [said infrared sensor 2, :remote control section 3, and room air temperature] -- predetermined -- pro -- a globefish -- a ram -- the interior of a room -- wind direction and airflow -- It consists of microprocessor 4 grades which control operation.

[0013] Drawing 3 is the schematic diagram of the infrared sensor applied to this invention.

Although the migration is not illustrated on a drawing since the infrared sensor 2 expresses the condition of detecting the existence of the body, moving vertically and horizontally, it is moved by the step motor at a predetermined include angle onto a level revolving shaft from on a perpendicular revolving shaft. namely, the time of right-and-left rotation -- the field A from Field B -- or it moves to Field D predetermined include-angle theta1 from Field C, and moves at the predetermined include angle theta 2 at the time of vertical rotation.

[0014] Drawing 4 is a drawing showing the result the infrared sensor applied to this invention has sensed the indoor field (A-L) to be it. A rise temperature curve is expressed that it expresses having sensed the existence and the migration condition of the body with the infrared sensor 2 in an indoor field, it was moved after stopping at 10-second spacing for every area, and drawing 4 (A) illustrated as the continuous line at the time of body detection.

[0015] Drawing 4 (B) is each field of drawing 4 (A), when the body has been sensed in the indoor field. The method which judges the current position of the body according to the temperature and the migration condition of the body which were detected by being related is expressed. Drawing 5 thru/or drawing 7 are the flow charts of the control approach of the air conditioner applied to this invention. The power source of an air conditioner 1 is impressed and the initial reset phase 401 is carried out.

[0016] Thus, in the initial reset phase 401, therefore, a microprocessor 4 depends on the remote control section 3, or a control unit besides ** at a user, and operation and laying temperature to operation are inputted. Under the present circumstances, a microprocessor 4 goes to a phase 402, moves an infrared sensing means to the initial valve position of indoor field A-L, and is located in an initial valve position A. Then, if it goes to a phase 403 and sensing time amount and an example are given, it will come to set 10 seconds and will go to a phase 404, and said sensing time amount is counted, and it subtracts every [1], and in a phase 405, the signal which follows the radiation temperature Ta of an indoor field from the infrared sensor 2 is inputted, and it comes, and it goes to a phase 406 continuously, and comes to sense [whenever / room air temperature] Tb whenever [room air temperature] from a sensor 5.

[0017] Then, a microprocessor 4 goes to a phase 408 in quest of temperature-gradient deltaT with Tb radiation temperature Ta and whenever [room air temperature] in a phase 407, and judges whether temperature-gradient deltaT is larger than the predetermined temperature of 3 degrees C. Usually, the radiant heat of the body depends on an infrared detection means, and is detected by 3 degrees C. If 3 degrees C or less of temperature gradients become, it will come to judge whether it said the predetermined phase 409 and sensing time amount (sensing field 1 section) was completed and predetermined sensing time amount will be completed In a phase 411, it judges whether the sensing sensor of the infrared sensor 2 was moved to the next sensing field, it went to the phase 412, and the sensing field predetermined [whole] has been sensed completely at the same time it decides radiation temperature, even if it says a phase 410.

[0018] On the other hand, if said temperature-gradient deltaT becomes the predetermined temperature of 3 degrees C or more in said phase 408, it will go to a phase 413, it judges whether radiation temperature Ta is larger than the predetermined temperature of 3 degrees C, and it will come to carry out the phase after saying a phase 409 etc., and if not large, if it becomes large on the contrary with this, it will say a phase 414 and will come to judge the location of the body.

[0019] As the above process illustrated to drawing 4 , when it has sensed by carrying out sensing time amount according to a sensing field respectively at 10 seconds, it can be judged that the body exists in the sensing fields B or L.

[0020] When sensing field completion is judged, a microprocessor 4 is said to a louver control process, senses Tb whenever [laying temperature / of remote control / Ts, and room air temperature] in a phase 416 first, and makes each field section ni initialize in a phase 417. The location of the body is checked according to the signal from the infrared sensor 2, going to degree the phase 418 and making said every one field section increase.

[0021] Then, in a phase 419, if whether the body check was completed judges and it is completed in the entire interval of the field section, the return of the control process will be

carried out so that ** may carry out the routine of others [microprocessor / 4 / ****]. If sensing of the field section is not completed in a phase 419 and laying temperature Ts is [whenever / room air temperature / told to the temperature decision phase 421 and the remote control laying temperature Ts has been sensed to be it / it judges whether it is larger than Tb and / whenever / room air temperature] larger than Tb That is, if it judges whether it will go to a phase 422 if laying temperature is lower than whenever [room air temperature] at the time of heating and cooling, and Body Ps is indoors and there is no body Ps, an indoor fan will be weak-operated in a phase 423, the direction of a louver is also set up perpendicularly, and it is made for whenever [room air temperature] not to become continuously lower than laying temperature.

[0022] On the other hand, judge whether when there is the body in a phase 422, the body is in the field section ni which went to the phase 424 and was sensed, and if there is nothing Although go to a phase 418, continue and it comes to check the body field section ni, it will go to a phase 425 if it comes to check the body field section ni and the body is in this check field section ni in this case, and temperature is detected ni-1 is made to move a radiant heat sensing means to an adjoining field between the segmentum anterius in the field section ni under monitor, and it comes to detect respectively the temperature T1 over an adjoining field, and the temperature [as opposed to ni+1 between the segmentum posterius of the field section ni under sensing] T2.

[0023] If temperature T1 and T2 is respectively detected in this phase 425, it will go to a phase 426, the temperature T1 over entire-interval ni-1 under sensing will be subtracted by Tb whenever [room air temperature], and it will come to judge whether this temperature subtracted widely is larger than the predetermined temperature of X degrees C. Under the present circumstances, if the subtracted temperature is larger than the predetermined temperature of X degrees C, it will say a phase 427 and will come to carry out the swing jazz of the direction of a louver to said adjoining section ni-1.

[0024] On the other hand, if the temperature subtracted in the phase 426 is smaller than the predetermined temperature of X degrees C If it goes to a phase 428, it judges whether the temperature which subtracted the sensing temperature T2 over ni+1 between the segmentum posterius under sensing, and was acquired by Tb whenever [current room air temperature] is larger than the predetermined temperature of X degrees C and subtraction temperature is larger than the predetermined temperature of X degrees C It says a phase 429 and comes to carry out the swing jazz of the direction of a louver to adjoining section ni+1, and if the temperature subtracted in said temperature-gradient decision phase 428 is smaller than the predetermined temperature of X degrees C, it will say a phase 430, and the direction of a louver will be set as the field section ni, and it will come to drive it.

[0025] On the other hand, it is made to carry out operation until it will say a phase 432, it will carry out a direction setup of the louver horizontally and the whole indoor temperature will reach homogeneity at laying temperature, if it judges whether it says a phase 431 and the body is indoors, when laying temperature T is [whenever / room air temperature] smaller than Ts in a phase 421 and there is no body.

[0026] If it is judged on the contrary that people are indoors in a phase 431, it will judge in which field section ni it says a phase 433 and people are. If there are no people in the field section ni, it will come to check the field section, saying said phase 428 and increasing the field section ni. however, the field which will say a phase 434 in a phase 433 in the condition that remote control laying temperature is lower than whenever [room air temperature] if the sensing location and the field section of the body are the same, and has the field section ni, i.e., the body, in the direction of a louver -- the other side -- it is made like and is made to perform air conditioning.

[0027] Moreover, he is trying to control airflow by other examples of this invention according to the existence and the migration direction of the body. When a user impresses a power source, an air conditioner 1 is reset like illustration of drawing 8 (phase 501).

[0028] Then, a microprocessor 4 comes to receive signals, such as whenever [operation mode and room air temperature], through sensor 5 grade whenever [remote control 3 or room air temperature], and comes to make an air conditioner operate according to it. Under the present

circumstances, as that detection sensor was illustrated by drawing 3 , it is moved vertically and horizontally, and the infrared sensor 2 scans indoor detection field A-L divided so that it might illustrate to drawing 1 , and comes to sense Tb, nothing [indoor human-body-presence], and the number K of the bodies whenever [room air temperature].

[0029] That is, a microprocessor 4 goes to a phase 502, sets up supervisory timer T one time, makes a counter reset and sets the count J of detection as 1 so that it may illustrate to drawing 8 . It is a means for determining whether a supervisory timer T1 carries out sensing of migration of the body twice here. In this example, it limited to 2 times.

[0030] After saying a phase 503 and setting the detection field 1 as 1, in a phase 504, the sensing time amount of the detection field timer T2 is set as the predetermined time amount Tc. You may be 10 seconds as long as it gives an example. Then, go to a phase 505, the detection field T2 is made to subtract every [1], and it is made for the sensing sensor of the infrared sensor 2 to sense the temperature of indoor field A-L.

[0031] Then, in a phase 506, it comes to ask for temperature-gradient deltaT with the radiation temperature Ta of Tb and the body whenever [room air temperature / of the detection field 1] from the infrared sensor 2, it says a phase 507, and judges whether temperature-gradient deltaT is larger than the predetermined temperature of 3 degrees C. If not large, it comes to judge whether it said the phase 508 and monitor time amount (detection field 1 section) was completed. If monitor time amount is completed, it will judge whether it said the phase 512 and the body detection field 1 was completed at the same time it says a phase 511 and decides radiation temperature. Henceforth, if the infrared sensor 2 is driven continuously and a multiplier is made to increase, it comes to sense other detection fields 1+1.

[0032] On the other hand, in a phase 507, if temperature-gradient deltaT is 3 degrees C or more in predetermined temperature, by saying a phase 509, it judges whether radiation temperature Ta is larger than the predetermined temperature of 3 degrees C, and if not large, it will go to a phase 508 and will come to carry out future phases. It judges whether the radiation temperature which will say a phase 510, will set up the number of the bodies, and will come to decide a location, then will say a phase 511, and will follow said number location decision of the bodies if it is judged in a phase 509 that radiation temperature Ta is large was decided, it said the phase 512, and the detection field 1 was completed. When not completed, it comes to decide location decision and radiation temperature of the number of the bodies, making the multiplier of the detection field 1 increase.

[0033] As [illustrate / by drawing 4 (A) and drawing 4 (B) / the result of the definite process of the number of the bodies, a location, and radiation temperature / of a more than / come]

[0034] Then, if it comes to complete the monitor of the number of the bodies, a location, and the radiation temperature decision and the detection field 1 Say a microprocessor 4 to a phase 514, come to judge whether the count J of detection of the detection field 1 is 2 times, and if the count J of detection is not 2 times at this time Only 1 makes the count J of detection, and a supervisory timer T1 increase so that the count of detection, a supervisory timer, and the number of the bodies may be computed in a phase 515, and the number K of the bodies is made to reset.

[0035] Moreover, when the number K of the bodies was not beyond a binary name, as it said the phase 516 and it judged whether the number K of the bodies was beyond a binary name, when it came to carry out repetitive execution of such a process and the count J of detection became twice in the phase 514, and it illustrated to drawing 10 , it transfers to the louver control routine 1, and comes to control a louver, but it is as follows if this process is investigated.

[0036] First, in a microprocessor 4, if Number K is sensed below at a binary name, the remote control laying temperature Ts, the detection field 1, and the count J of detection are set as 1 in a phase 601, and it will come to carry out temperature detection of relevance, increasing the multiplier of the detection field 1 by every [1], if it says the next phase 602. Therefore, in a phase 603, if whether whole field detection was completed judges and it is completed, it will say a phase 604 and will judge whether the remote control laying temperature Ts is [whenever / room air temperature] larger than Tb. If laying temperature Ts is large (i.e., if whenever [room air temperature] becomes low), it will judge whether it says a phase 605 and there is any body

Ps. If it is judged that there is the body Ps, it says a phase 606, and weak-operating an indoor fan motor so that it may not be air-conditioned any more, the direction of a louver will be made into a body Ps location, and indoor airflow and wind direction will be controlled.
[0037] On the other hand, since whenever [room air temperature] is high at the time of air conditioning when laying temperature Ts is [whenever / room air temperature] smaller than Tb in a phase 604, in order to make air conditioning quick, it says a phase 607 and the existence of Body Ps is judged. It comes to carry out air conditioning, saying a phase 608, strong-operating the indoor fan motor RPM, and carrying out the swing jazz of the direction of a louver horizontally, if there are no people. If it is judged that laying temperature Ts is [whenever / room air temperature] higher than Tb in a phase 604, and there is the body Ps in a phase 607 on the contrary (i.e., if whenever [room air temperature] is high and there is the body Ps), it will say a phase 609, an indoor fan motor will be strong-operated, the direction of a louver will be carried out in the direction of the body, and it will come to carry out air conditioning.
[0038] On the other hand, if field sensing is completed in a phase 603, after saying a phase 610, clearing detection field 1 multiplier and making the count of detection increase, it says a phase 611 and judges whether the count J of detection is 3 times. If it is not 3 times, it will say a phase 605 and a subsequent phase will be carried out, and on the contrary, if it is 3 times, a return will be carried out and it will come to carry out repetitive execution of the louver 1 routine.
[0039] On the other hand, if two or more persons sensed in a phase 516 become in drawing 8 , it will transfer to the looper routine II like illustration of drawing 11 . That is, it comes to make the detection field 1, Number K, and the initial valve position Rs of a looper initialize in the initialization phase 701.
[0040] Then, in a phase 702, the increment of the detection field is carried out every [1]. Then, if it comes to judge whether it said the phase 703 and detection of the detection field 1 was completed and detection of a whole detection field is completed, a return will be changed into a condition at first. If detection of a whole detection field is not completed, it will judge whether there is any body in the predetermined detection field 1 at the same time it judges whether it said the phase 704 and the count J of detection was made once. When the number K of the bodies is detected in 1 time of the count of detection, and the detection field 1 at this time (P11=1), Number K is made to increase by every [1] (phase 705). Then, if it does not judge whether it said the phase 706 and there was any body at the time of one count of detection, and two counts of detection, it will go to a phase 702, and if there is the body, it will say a phase 707 and the number K of the bodies will be judged. Under the present circumstances, if it judges whether it says a phase 708 and the louver is coming to the initial valve position, if the number K of the bodies is the same and the louver location is coming to the initial valve position, it will say a phase 709 and a louver will be moved to a detection region. Henceforth, it transfers to a phase 715 by decision of that judge whether it will say a phase 714 if the number K of the bodies is not in agreement in the phase 707 in the process which carries out repetitive execution of a phase 702 to the phase 709, and it is the same as the number of the bodies at a counter, and it is the same, a louver location is set as ******, and it says after that and a phase 716, and is made to carry out swing jazz from a **** point to ******.
[0041] On the other hand, if there is no body in the detection field 1 when the count of detection is 1 time in a phase 704, it will judge whether it says a phase 710 and the body is in the detection field 1 at the time of two counts of detection (Ps 1= 1). If there is no body, it judges whether it says a phase 711, and only 1 makes the number of the bodies increase, it says the next phase 712, and there is any body and there is the body, it will say a phase 713 and setting control of the louver initial valve position will be carried out in a body sensing location. Moreover, if there is no body in a phase 712, it will say a phase 714 and a subsequent phase will be carried out, but after setting up the initial valve position and ****** location of a louver in a phase 715, louver swing jazz is carried out in a phase 716, the location of the sensed body is mainly carried out, and it comes to carry out air conditioning.
[0042]
[Effect of the Invention] This invention explained above is set by the air conditioner to harmonize indoor air. An air-conditioning ambient atmosphere is developed to the field in which

people are preferentially located by sensing nothing [human-body-presence] indoor and an indoor migration situation, sensing the number of people therefore to the temperature according to this condition of having been sensed, and controlling airflow and wind direction. It carries out for those who control the temperature of the indoor whole region and are indoors to be able to have comfortable sensibility in every indoor location. Since especially the principle of this invention guides airflow and wind direction to the field to which no body is during heating, it is applicable to a heater machine.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The instantiation Fig. showing the condition of sensing the indoor field applied to this invention.
[Drawing 2] The block diagram of the air-conditioning system applied to this invention.
[Drawing 3] The schematic diagram of the sensor applied to this invention.
[Drawing 4] A Fig. and B Fig. are a graph which expresses the condition of having sensed nothing [human-body-presence] and temperature with the sensor applied to this invention.
[Drawing 5] The first portion of the flow chart showing the wind direction applied to this invention, and the air-flow-rate-control approach.
[Drawing 6] Pars intermedia of the flow chart showing the wind direction applied to this invention, and the air-flow-rate-control approach.
[Drawing 7] The second half section showing the wind direction applied to this invention, and the air-flow-rate-control approach of a flow chart.
[Drawing 8] The wind direction of other examples applied to this invention, and the first portion of the flow chart of the air-flow-rate-control approach.
[Drawing 9] The wind direction of other examples applied to this invention, and the second half section of the flow chart of the air-flow-rate-control approach.
[Drawing 10] The flow chart which controls the airflow and wind direction at the time of one person's body sensing by the control approach of other examples applied to this invention.
[Drawing 11] The flow chart which controls the airflow and wind direction at the time by the control approach of other examples applied to this invention. [persons / two or more]
[Description of Notations]
1 Air Conditioner
2 Infrared Sensor
3 Remote Control Section
4 Microprocessor
5 Room Temperature Sensor

[Translation done.]

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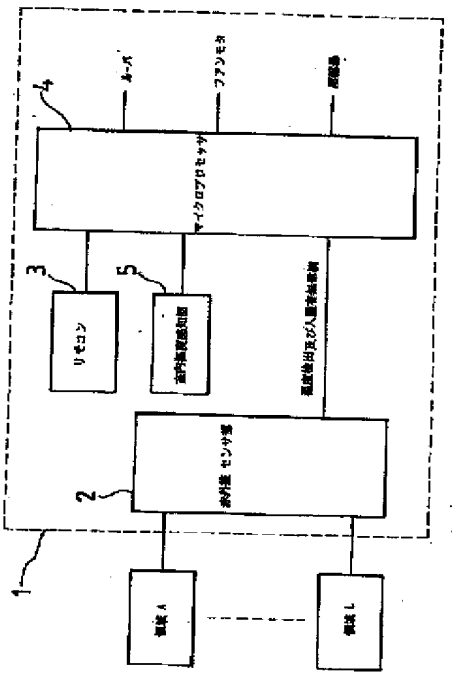
(54)【発明の名称】　空気調和システム

(57)【要約】
【目的】　室内の人体有無及び移動領域を感知し、この感知された状態に従って風向及び風量を制御して室内全域の温度を制御する空気調和システムを提供する。
【構成】　室内空気を調和する空気調和システムにおいて、空気調和機（１）の感知部（２）で室内の人体及び人体の移動を感知し、この感知された状態に従って室内送風ファンで風量を調節して室内全域の温度を制御すると共に、人体の移動状況に従ってルーバーのスウィングを調節して室内のどの位置にても快適な感じを得るようにする。



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【特許請求の範囲】

【請求項1】　室内温度を感知し、この感知された温度と設定された温度とを比較して、設定温度に近接されるように室内空気調和を行う空気調和機の制御方法において、

室内領域を所定の区間に区分しその区間を所定時間の間次々に監視しながら輻射温度を検出する段階と、

前記温度感知段階で感知された温度と室内温度との温度差を求め、この温度差が所定の温度以上であり、所定の輻射温度以上であるかを判断して人体の位置及び室内領域温度感知が完了されたかを判断する段階と、

室内温度と設定温度との温度差を判断して人体の有無を判断する段階と、

人体検出地域の温度と人体隣接地域の温度との比較で前記ルーバーの方向及び風量を制御する段階等で構成される空気調和機の制御方法。

【請求項2】　第1項において、

室内の人体位置が判断されると検出領域区間がどこであるかを判断する段階と検出領域区間感知が完了されない場合室内温度とリモコン設定温度を比較して室内温度が低い時、人体が感知された領域の隣接領域温度を感知して所定温度と比較して隣接区間にスウィングするようにする段階でなる空気調和機の制御方法。

【請求項3】　第1項において、

室内温度が低くて人体が検出されないと室内送風ファンを弱運転し、ルーバーを垂直方向にする風量及び風向を制御する空気調和機の制御方法。

【請求項4】　第1項において、

リモコン設定温度と室内温度を比較して室内温度が高くて人体がないとの判断であるとルーバーを水平方向にし、室内温度が高くて検出区域で人体が検出されると隣接領域にルーバー方向を設定して風量及び風向を制御する空気調和機の制御方法。

【請求項5】　室内温度を感知し、この感知された温度と設定された温度とを比較して、設定温度に近接されるように室内空気調和を行う空気調和機の制御方法において、

室内の人体有無と移動状態を感知し室内温度と人体感知による輻射温度との温度差を算出する段階と、

上記温度算出段階において算出された温度差と輻射温度とを比較し、輻射物の温度と人体位置を確定する段階と、

上記人体位置判断段階において、感知された領域及び人体の数によりルーバーの方向制御及び送風ファンの風量制御をし得られる段階からなる空気調和機の制御方法。

【請求項6】　第5項において、

人体検出領域及び検出回数を判断して、人体数を判断し、検出された人体数が1のとき温度を判断して、室内ファン回転数と、ルーバー回転方向を制御する段階からなる空気調和機の制御方法。

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【請求項7】　第6項において、

人体数が2以上と判断されるとき、人体の位置にルーバー回転方向を初期指針と最終指針を設定したのち、スウィングさせる段階からなる空気調和機の制御方法。

【請求項8】　室内温度を感知し、この感知された温度と設定された温度とを比較して設定温度に近接するように案内空気調和をする空気調和機において、

室内領域を所定の区間に分割して人体から放射する輻射線を感知する為に上下左右に移動可能な感知手段と、

前記感知手段が所定の区間別に移動するように制御し、人体の存在与否及び移動有無を判断し、これを基礎として室内送風ファンの回転数及びルーバーの移動方向と圧縮機の運転を制御する制御手段を具備する空気調和システム。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、空気調和システムに関するものであり、特に室内に人体の存在及び移動領域に従って風向及び風量を適切に制御して快適な室内空気調和をなし得るようにした空気調和機の制御方法に関するものである。

【0002】

【従来の技術】従来の空気調和機においては室内負荷変動に従って空気調和をするように設定温度と検出温度との温度差を検出し、この検出された温度差に従って定められた設定値に温度が近似する時まで室内風量及び圧縮機を制御するようになっていた。

【0003】然しながら、従来の空気調和機においては室内の負荷変動を単純に吸入空気だけで判断して室内の全体空気調和をするようになっている関係上、人体に対する空調効果が未治な問題点を持っており、室内では居住者の位置に関係無しに空調がなされるので適切な状態の空調状態を感じるためには、長時間待たなければならなかった。

【0004】このような問題を解決する為に、日本特許公開公報第昭64－79532号は空気調和機の風向制御方法及び装置を提供するのに関するものを提示している。

【0005】この特許は、複数個の指向性を持つ赤外線センサーでなる検知手段1と、検知信号増幅手段2と、増幅信号を比較する比較手段4と、風向制御翼13と、比較手段の出力に依って人体位置を判定する判定手段10及び風向制御駆動手段11とを具備していて、人体から放射する赤外線を検知して人体の位置及び人体の分布が大きい区間（冷房機の場合）、或いは人体が存在しないか集団分布が小さい区間（暖房機の場合）に向うようにルーバーを駆動して風向を制御するので快適な冷暖房がなされるようにする。

【0006】

【発明が解決しようとする課題】この場合、多数の人体

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感知手段に依り人の存在有無に従って風向を誘導するようにルーバー駆動を制御することにその目的があるので、人体の有る地域が室内設定温度より高くなるに従う効果的な空調がなされないので、実際に室内にある人には空調状態をよく感じられない状態になっていた。

【０００７】

【発明の目的】本発明の目的は、室内の人体有無及び移動領域を感知し、この感知された状態に従って風向及び風量を制御して室内全域の温度を制御する空気調和システムを提供することにある。本発明の他の目的は、赤外線センサーでなる感知手段を所定の領域区間別に移動させながら、各区間別に人体の存在有無及び移動状態を感知してルーバーの移動方向及び室内送風ファンの圧縮機運転を制御する空気調和機の空気調和制御方法を提供することにある。本発明のまた一つの目的は室内の人体存在有無及び移動状態を感知して室内全域の温度を効果的に制御する空気調和機の制御方法を提供する。本発明のまた他の目的は、室内全域に対する空気調和が人体有無及び移動領域をさけてなされるようにして暖房機に適用可能にした空気調和機の制御方法を提供することにある。

【０００８】このような目的を達成する為に、室内領域を所定の区間に分割しながら人体から放射する輻射線を感知する為に、上下左右に移動可能な感知手段と、前記感知手段が所定の区間別に移動するように制御し、人体の存在与否及び移動有無を判断してこれを基礎として室内送風ファンの回転数、移動方向及び圧縮機の運転を制御するマイクロプロセサーで構成される。

【０００９】このような構成でなる本発明の空気調和制御方法は、室内領域を所定の区間に分割して所定時間の間、温度を感知する段階と、前記温度感知段階で感知された温度と室内温度との温度差を求め、この温度差が所定の温度以上であり、所定の輻射温度以上であるかを判断した後、人体の位置及び室内領域感知が完了されたかを判断する段階と、室内温度と室内設定温度との温度差を判断した後、人体有無に従って人体感知地域の温度と所定の温度との比較で前記ルーバーの方向及び送風ファンの風量を制御する段階とで構成される。

【００１０】また、本発明のまた他の方法としては、人体有無と移動状態を感知して室内温度と人体感知に従う輻射温度との減算で温度差を算出する温度算出段階と、前記温度算出段階で算出された状態に従って輻射温度及び人体の位置を判断する人体位置判断段階と、前記人体位置判断段階で感知された領域及び人の数に従ってルーバーの方向制御及び風量制御をなし得るよう制御段階で制御されるようにしたことを特徴とする。

【００１１】

【実施例】以下、添付された図面に依り本発明を詳細に説明すると次のようである。図１は本発明に適用される空気調和機の赤外線感知部が室内領域を感知する過程を

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表わす例示図である。空気調和機１は赤外線感知部２を具備し、赤外線感知部２は室内領域を所定の区間Ａ－Ｌに１２等分して順序的に感知するように設置されている。

【００１２】図２は本発明に適用される空気調和システムの制御ブロック図である。室内の人体数及び人体の有無及び室内温度を感知しこの感知された状態に該当する感知信号、即ち人体の有無、人体の数、人体の移動状態信号、及び室内温度信号を出力させる赤外線感知部２と：室内温度を感知する室内温度感知部５と：空気調和機の冷房及び暖房中の運転モード及び室内設定温度等を入力するリモコン部３と：前記赤外線感知部２と：リモコン部３と室内温度感知部５から入力される信号を所定のプロフグラムにより室内風向、風量、運転を制御するマイクロプロセサー４等で構成される。

【００１３】図３は本発明に適用される赤外線感知部の概略図である。赤外線感知部２は上下左右に動きながら人体の有無を検出する状態を表わしたものであるので、その移動は図面に図示していないが、垂直の回転軸上から水平回転軸上にステップモーターにより所定角度で移動される。即ち、左右回転時は領域Ｂから領域Ａに或いは領域Ｃから領域Ｄに所定角度θ１移動し、上下回転時には所定角度θ２で移動する。

【００１４】図４は本発明に適用される赤外線感知部が室内領域（Ａ－Ｌ）を感知した結果を表わした図面である。図４（Ａ）は室内領域にて赤外線感知部２で人体の有無及び移動状態を感知したことを表わすもので、各区域ごとに１０秒間隔に停止した後移動され、また人体検出時は実線で図示したように上昇温度曲線を表わす。

【００１５】図４（Ｂ）は室内領域で人体が感知された時図４（Ａ）の各領域と　関して検出された温度と人体の移動状態に従って人体の現在位置を判断する方式を表わす。図５ないし図７は本発明に適用される空気調和機の制御方法のフローチャートである。空気調和機１の電源が印加されて初期リセット段階４０１を遂行する。

【００１６】このように初期リセット段階４０１で、マイクロプロセサー４は使用者に依ってリモコン部３或いは其他操作部に依り運転に対する運転及び設定温度が入力される。この際、マイクロプロセサー４は段階４０２にいき室内領域Ａ－しの初期位置に赤外線感知手段を移動させて初期位置Ａに位置させる。その後、段階４０３にいき感知時間、実例をあげれば、１０秒をセットするようになり、段階４０４にいき前記感知時間をカウントして１ずつ減算し、段階４０５では赤外線感知部２から室内領域の輻射温度Ｔａに従う信号を入力されるようになり、続いて段階４０６にいき室内温度感知部５から室内温度Ｔｂを感知するようになる。

【００１７】その後、マイクロプロセサー４は段階４０７で輻射温度Ｔａと室内温度Ｔｂとの温度差ΔＴを求め段階４０８にいき温度差ΔＴが所定の温度３℃より大き

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いかを判断する。通常、人体の輻射熱は赤外線検出手段に依り3℃に検出される。若し、温度差が3℃以下ならば、所定の段階４０９にいって感知時間（感知領域1区間）が完了されたかを判断するようになり、所定の感知時間が完了されると、段階４１０にいっても輻射温度を確定すると同時に段階４１１では赤外線感知部2の感知センサーを次の感知領域に移動させ、段階４１２にいき所定の全体の感知領域を完全に感知したかを判断する。

【００１８】一方、前記段階４０８で前記温度差ΔＴが所定の温度3℃以上ならば、段階４１３にいき、輻射温度Ｔａが所定の温度3℃より大きいかを判断して大きくなければ、段階４０９にいって以後の段階等を遂行するようになり、これとは反対に大きくなれば、段階４１４にいって、人体の位置を判断するようになる。

【００１９】以上の過程により図4に図示したように、感知時間を各々感知領域別に１０秒にして感知した時、感知領域ＢまたはＬで人体が存在すると判断できるようになるものである。

【００２０】感知領域完了が判断されると、マイクロプロセサー４はルーバー制御過程にいって、先ず段階４１６ではリモコンの設定温度Ｔｓ及び室内温度Ｔｂを感知し、段階４１７では各領域区間ｎｉを初期化させる。その次、段階４１８にいき前記領域区間を1つずつ増加させながら赤外線感知部2からの信号に従って人体の位置を確認する。

【００２１】続いて、段階４１９では領域区間の全区間で人体確認が完了されたかを判断し、完了されたら制御過程をのがれてマイクロプロセサー４が他のルーチンを遂行するようにリターンする。若し、段階４１９で領域区間の感知が完了されなかったら、温度判断段階４２１にいってリモコン設定温度Ｔｓが感知された室内温度Ｔｂより大きいかを判断し、設定温度Ｔｓが室内温度Ｔｂより大きいと、即ち冷暖時設定温度が室内温度より低いと、段階４２２にいき室内に人体Ｐｓが有るかを判断して人体Ｐｓが無ければ、段階４２３では室内ファンを弱運転し、ルーバー方向も垂直方向に設定して継続的に室内温度が設定温度より低くならないようにする。

【００２２】一方、段階４２２で人体が有ると、段階４２４にいき感知していた領域区間ｎｉに人体が有るかを判断して、無ければ、段階４１８にいき継続して人体領域区間ｎｉを確認するようになり、この際、人体領域区間ｎ１を確認するようになり、この確認領域区間ｎ１に人体が有れば、段階４２５にいき温度を検出するが、監視中の領域区間ｎｉ中の前区間ｎｉ－１に隣接領域へ輻射熱感知手段を移動させ、隣接領域に対する温度Ｔ１と、感知中の領域区間ｎｉの後区間ｎｉ＋１に対する温度Ｔ２を各々検出するようになる。

【００２３】この段階４２５で温度Ｔ１，Ｔ２が各々検出されると、段階４２６にいき、室内温度Ｔｂで感知中の全区間ｎｉ－１に対する温度Ｔ１を減算し、この広く

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減算された温度が所定の温度Ｘ℃より大きいかを判断するようになる。この際、減算された温度が所定の温度Ｘ℃より大きいと、段階４２７にいってルーバー方向を前記隣接区間ｎｉ－１にスウィングさせるようになる。

【００２４】一方、段階４２６で減算された温度が所定の温度Ｘ℃より小さいと、段階４２８にいき、現在の室内温度Ｔｂで感知中の後区間ｎ１＋１に対する感知温度Ｔ２を減算して得られた温度が所定の温度Ｘ℃より大きいかを判断し、減算温度が所定の温度Ｘ℃より大きいと、段階４２９にいってルーバー方向を隣接区間ｎｉ＋１にスウィングさせるようになり、前記温度差判断段階４２８で減算された温度が所定の温度Ｘ℃より小さいと、段階４３０にいってルーバーの方向を領域区間ｎｉに設定して駆動するようになる。

【００２５】一方、段階４２１で設定温度Ｔが室内温度Ｔｓより小さいと、段階４３１にいって室内に人体が有るかを判断し人体が無ければ段階４３２にいってルーバーを水平に方向設定して室内全体温度が均一に設定温度に到達する時まで運転を遂行するようにする。

【００２６】反対に、段階４３１で室内に人が有ると判断されると、段階４３３にいってどの領域区間ｎｉに人が有るかを判断する。若し、領域区間ｎｉに人が無いと、前記段階４２８にいって領域区間ｎｉを増加しながら領域区間を確認するようになる。然し、段階４３３でリモコン設定温度が室内温度より低い状態で人体の感知位置及び領域区間がおなじければ段階４３４にいってルーバー方向を領域区間ｎｉ、即ち、人体が有る領域に向うようにして空気調和をおこなうようにする。

【００２７】また、本発明の他の実施例では人体の有無と移動方向に従って風量を制御するようにしている。使用者が電源を印加する時、図8の図示のように空気調和機1はリセットされる（段階５０１）。

【００２８】その後、マイクロプロセサー４はリモコン3や室内温度感知部5等を通して運転モード及び室内温度等の信号を受信するようになり、それに従って空気調和機を運転させるようになる。この際、赤外線感知部2はその検知センサーが図3に図示されたように、上下左右に移動され、図1に図示するように分割された室内検出領域Ａ－Ｌを走査して室内温度Ｔｂ、室内人体有無及び人体数Ｋを感知するようになる。

【００２９】即ち、図8に図示するように、マイクロプロセサー４は段階５０２にいき監視タイマーＴを1設定し、カウンターをリセットさせ、検出回数Ｊを1に設定する。ここで監視タイマーＴ１は人体の移動の感知を2回するかを決定する為の手段である。本実施例では2回に限定した。

【００３０】段階５０３にいって検出領域1を1に設定した後、段階５０４では検出領域タイマーＴ２の感知時間を所定の時間Ｔｃに設定する。実例をあげれば、１０秒であってもよい。続いて、段階５０５にいき検出領域

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Ｔ２を１ずつ減算させて、赤外線感知部２の感知センサーが室内領域Ａ－Ｌの温度を感知するようにする。

【００３１】その後、段階５０６では赤外線感知部２から検出領域１の室内温度Ｔｂと人体の輻射温度Ｔａとの温度差ΔＴを求めるようになり、段階５０７にいって温度差ΔＴが所定の温度３℃より大きいかを判断する。若し、大きくなければ、段階５０８にいって監視時間（検出領域１区間）が完了されたかを判断するようになる。監視時間が完了されると、段階５１１にいって輻射温度を確定すると同時に段階５１２にいって人体検出領域１が完了されたかを判断する。以後、継続して赤外線感知部２を駆動して係数を増加させると他の検出領域１＋１を感知していくようになる。

【００３２】一方、段階５０７で、温度差ΔＴが所定の温度３℃以上であれば、段階５０９にいって輻射温度Ｔａが所定の温度３℃より大きいかを判断して大きくないと、段階５０８にいき、以後の段階を遂行するようになる。若し、段階５０９で輻射温度Ｔａが大きいと判断されると、段階５１０にいって人体数を設定して位置を確定するようになり、続いて、段階５１１にいって前記人体数位置確定に従う輻射温度を確定し、段階５１２にいって検出領域１が完了されたかを判断する。完了されなかった場合、検出領域１の係数を増加させながら人体数の位置確定及び輻射温度を確定するようになる。

【００３３】以上におけるように、人体数、位置及び輻射温度の確定過程の結果は図４（Ａ）及び図４（Ｂ）に図示されたようになる。

【００３４】続いて、人体数、位置と輻射温度確定、検出領域１の監視を完了するようになると、マイクロプロセサー４は段階５１４にいって検出領域１の検出回数Ｊが２回であるかを判断するようになり、この時、検出回数Ｊが２回でなければ、段階５１５で検出回数、監視タイマー、人体数を算出するように検出回数Ｊ、監視タイマーＴ１を１だけ増加させ、人体数Ｋはリセットさせる。

【００３５】また、このような過程を反復遂行するようになり、段階５１４で検出回数Ｊが２回ならば、段階５１６にいって人体数Ｋが２名以上であるかを判断し人体数Ｋが２名以上でなければ、図１０に図示したようにルーバー制御ルーチン１に移転してルーバーを制御するようになるが、この過程を調べてみると次のようである。

【００３６】先ず、マイクロプロセサー４では人数Ｋが２名以下に感知されると、段階６０１でリモコン設定温度Ｔｓ、検出領域１、検出回数Ｊを１に設定し、その次の段階６０２にいっては検出領域１の係数を１ずつ増加しながら該当の温度検出をするようになる。従って、段階６０３では全体領域検出が完了されたかを判断して完了されたならば、段階６０４にいってリモコン設定温度Ｔｓが室内温度Ｔｂより大きいかを判断する。若し、設定温度Ｔｓが大きいと、即ち、室内温度が低くなると、

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段階６０５にいって人体Ｐｓが有るかを判断する。人体Ｐｓが有ると判断されると、段階６０６にいって、それ以上冷房にならないように室内ファンモーターを弱運転しながらルーバー方向を人体Ｐｓ位置にして室内風量及び風向を制御する。

【００３７】一方、段階６０４で設定温度Ｔｓが室内温度Ｔｂより小さいと、冷房時に室内温度が高いので冷房を迅速にさせる為に段階６０７にいって人体Ｐｓの有無を判断する。若し、人が無ければ段階６０８にいって室内ファンモーターＲＰＭを強運転してルーバー方向を水平にスウィングしながら空気調和をするようになる。反対に、段階６０４で設定温度Ｔｓが室内温度Ｔｂより高いし、段階６０７で人体Ｐｓが有ると判断されると、即ち、室内温度が高く人体Ｐｓが有ると、段階６０９にいって室内ファンモーターを強運転しルーバー方向を人体の方向にして空気調和をするようになる。

【００３８】一方、段階６０３で領域感知が完了されたら、段階６１０にいって検出領域１係数をクリアし、検出回数を増加させた後、段階６１１にいって検出回数Ｊが３回であるかを判断する。３回でなければ、段階６０５にいってその後の段階を遂行し、反対に、３回であれば、リターンされてルーバー１ルーチンを反復遂行するようになる。

【００３９】一方、図８において、段階５１６で感知された人が２人以上ならば、図１１の図示のように、ルーバールーチンIIに移転する。即ち、初期化段階７０１では検出領域１、人数Ｋ、ルーバーの初期位置Ｒｓを初期化させるようになる。

【００４０】続いて、段階７０２では検出領域を１ずつ増分させる。その後、段階７０３にいって検出領域１の検知が完了されたかを判断するようになり、全体検出領域の検知が完了されたら、最初状態にリターンする。全体検出領域の検知が完了されていなかったら、段階７０４にいって検出回数Ｊが１回なされたかを判断すると同時に所定の検出領域１で人体が有るかを判断する。この時、１回の検出回数と検出領域１で人体数Ｋを検出した場合（Ｐ１１＝１）、人数Ｋを１ずつ増加させる（段階７０５）。その後、段階７０６にいって検出回数１回の時と検出回数２回の時に人体が有ったかを判断しなかったならば段階７０２にいき、人体が有ったならば段階７０７にいって人体数Ｋを判断する。この際、人体数Ｋが同一ならば、段階７０８にいってルーバーが初期位置に来ているかを判断し、ルーバー位置が初期位置に来ていれば、段階７０９にいってルーバーを検出領域位置に移動させる。以後、段階７０２から段階７０９を反復遂行する過程中、段階７０７で人体数Ｋが一致しないと、段階７１４にいってカウンターで人体数と同じかを判断し、同一であるとの判断で段階７１５に移転してルーバー位置を終地点に設定し、その後、段階７１６にいって始作地点から終地点までスウィングさせるようにする。

【００４１】一方、段階７０４で検出回数が１回である時、検出領域１に人体が無ければ、段階７１０にいって検出回数２回の時（Ｐｓ１＝１）検出領域１に人体が有るかを判断する。人体が無ければ、段階７１１にいって人体数を１だけ増加させ、その次の段階７１２にいって人体が有るかを判断し、人体が有ったら段階７１３にいってルーバー初期位置を人体感知位置に設定制御する。また、段階７１２で人体が無ければ、段階７１４にいってその後の段階を遂行するが、段階７１５でルーバーの初期位置と終地点位置を設定した後、段階７１６でルーバースウィングをして、感知された人体の位置を主にして空気調和をさせるようになる。

【００４２】

【発明の効果】以上で説明した本発明は、空気調和機で室内空気を調和するにおいて、室内の人体有無及び移動状況を感知し、この感知された状態に従う温度に依って人の数を感知して風量及び風向を制御することによって優先的に人が位置する領域に空調雰囲気を造成し、室内全域の温度を制御して室内にある人が室内のどの位置においても快適なる感じをもつことができようにする。特に、本発明の原理は暖房中には人体が無い領域に風量及び風向を誘導するので暖房器機に適用することが出来る。

【図面の簡単な説明】

【図１】本発明に適用された室内領域を感知する状態を表わす例示図。

【図２】本発明に適用される空気調和システムのブロック図。

【図３】本発明に適用される感知部の概略図。

【図４】Ａ図及びＢ図は本発明に適用される感知部にて人体有無及び温度を感知した状態を表わす図表。

【図５】本発明に適用される風向、風量制御方法を表わすフローチャートの前半部。

【図６】本発明に適用される風向、風量制御方法を表わすフローチャートの中間部。

【図７】本発明に適用される風向、風量制御方法を表わすフローチャートの後半部。

【図８】本発明に適用される他の実施例の風向及び風量制御方法のフローチャートの前半部。

【図９】本発明に適用される他の実施例の風向及び風量制御方法のフローチャートの後半部。

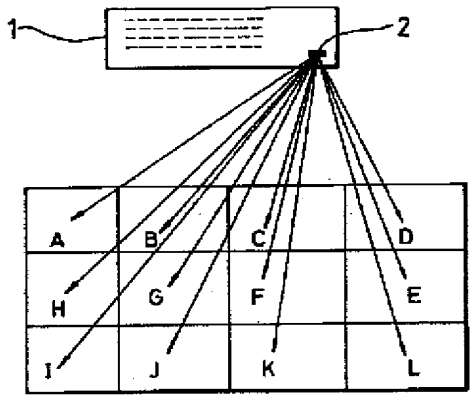
【図１０】本発明に適用される他の実施例の制御方法で一人の人体感知時の風量及び風向を制御するフローチャート。

【図１１】本発明に適用される他の実施例の制御方法で二人以上の時の風量及び風向を制御するフローチャート。

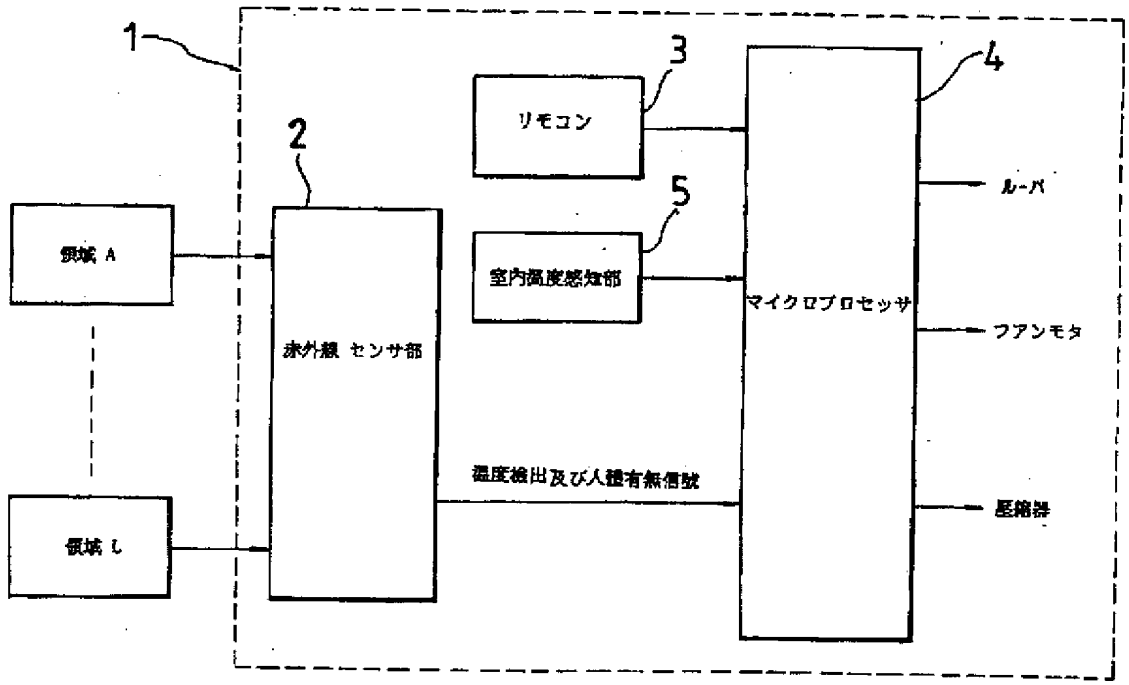
【符号の説明】

1　空気調和機
2　赤外線感知部
3　リモコン部
4　マイクロプロセサー
5　室温感知部

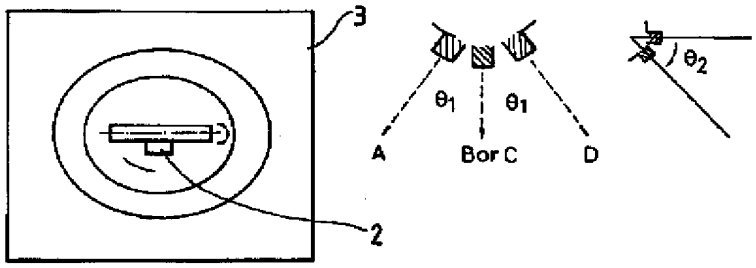
【図１】



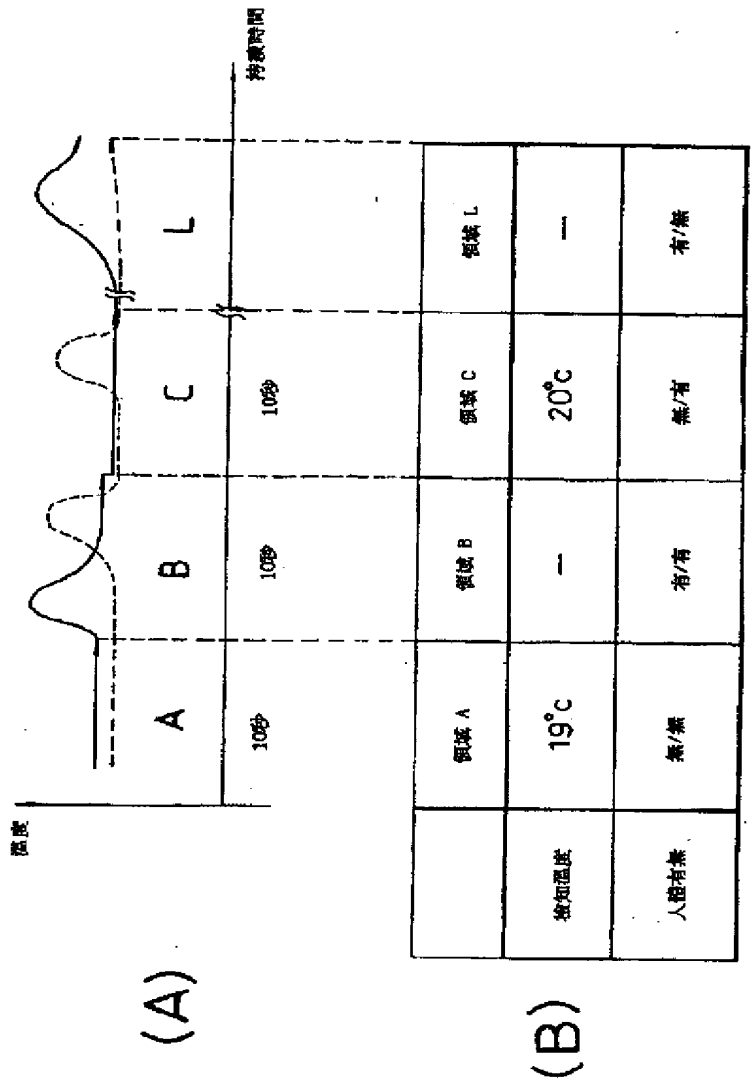
【図2】


1
2
3
4
5
リモコン
ルーバ
領域 A
室内温度感知部
マイクロプロセッサ
ファンモタ
赤外線 センサ部
温度検出及び人体有無信号
領域 L
圧縮器

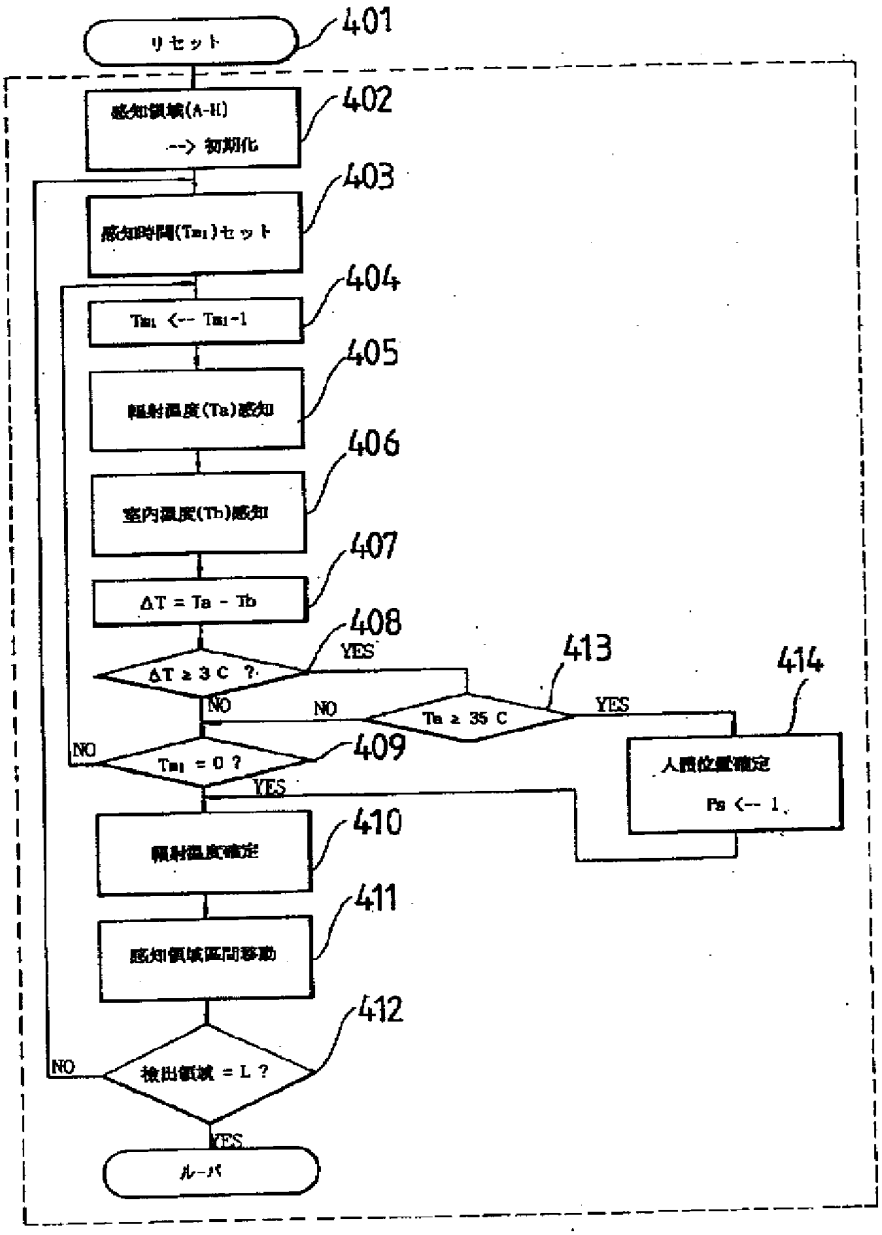
【図3】


3
2
θ1
θ1
θ2
A
B or C
D

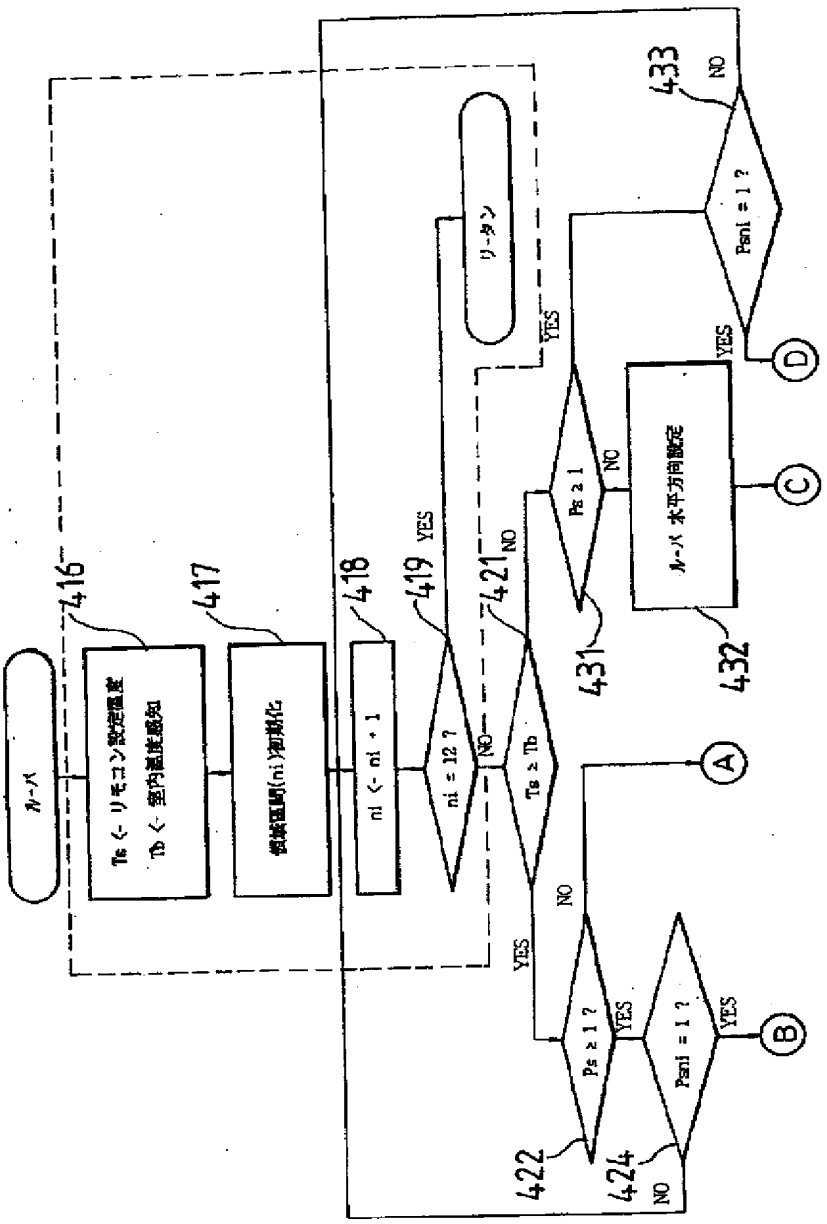
【図4】


(A)
温度
時間
A
B
C
L
10秒
10秒
10秒
(B)
領域 A
領域 B
領域 C
領域 L
検知温度
19℃
—
20℃
—
人格有無
無/無
有/有
無/有
有/無

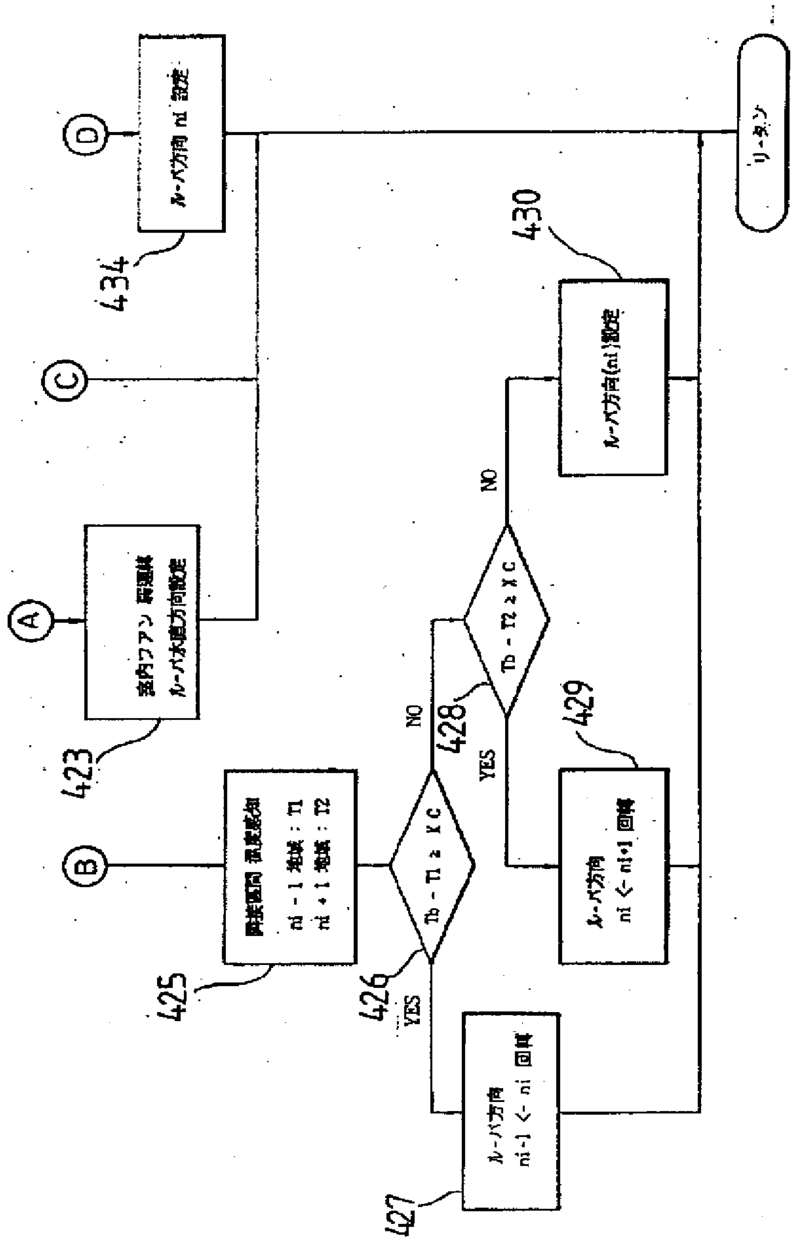
【図５】


リセット
401
感知領域(A-H)
--> 初期化
402
感知時間(Tm1)セット
403
Tm1 <-- Tm1-1
404
輻射温度(Ta)感知
405
室内温度(Tb)感知
406
ΔT = Ta - Tb
407
ΔT ≥ 3 C ?
408
YES
NO
Ta ≥ 35 C
413
YES
NO
414
人間位置確定
Ps <-- 1
Tm1 = 0 ?
409
NO
YES
輻射温度確定
410
感知領域区間移動
411
検出領域 = L ?
412
NO
YES
ルーパ

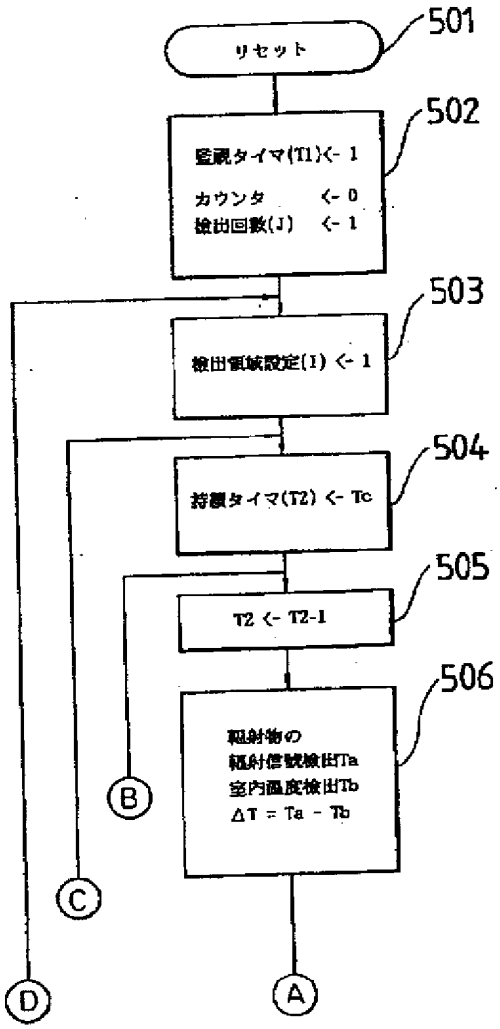
【図６】


スタート
Ts ← リモコン設定温度
Tb ← 室内温度検知
416
感知区間(ni)初期化
417
ni ← ni + 1
418
ni = 12 ?
419
YES
NO
Ts ≧ Tb
421
NO
YES
リターン
Ps ≧ 1
NO
YES
431
ルーバ 水平方向設定
432
Pani = 1 ?
433
NO
YES
D
C
A
Ps ≧ 1 ?
422
YES
NO
Pani = 1 ?
424
YES
NO
B

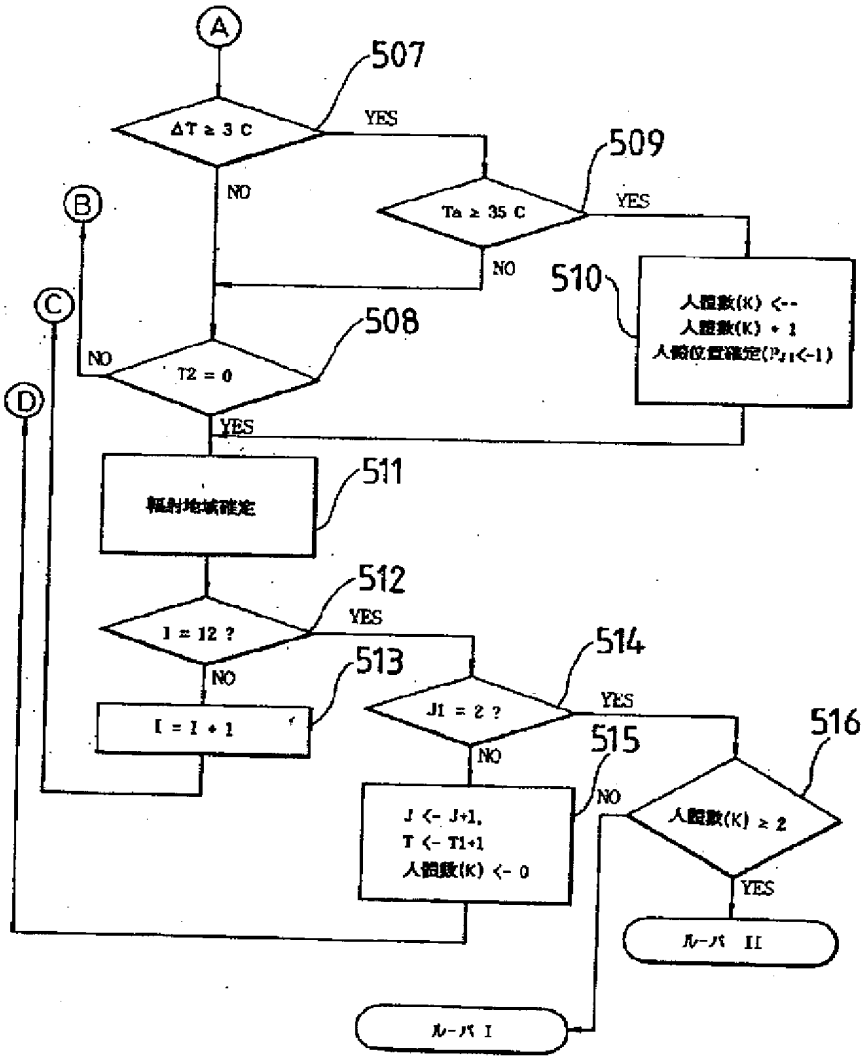
【図7】


D
ルーバ方向 ni 設定
434
C
A
423
B
425
ni－1 地域：T1
ni＋1 地域：T2
Tb－T1 ≧ K C
426
YES
NO
ルーバ方向
ni-1 ← ni 回転
427
Tb－T2 ≧ K C
428
YES
NO
ルーバ方向
ni ← ni+1 回転
429
ルーバ方向(ni)設定
430
リターン

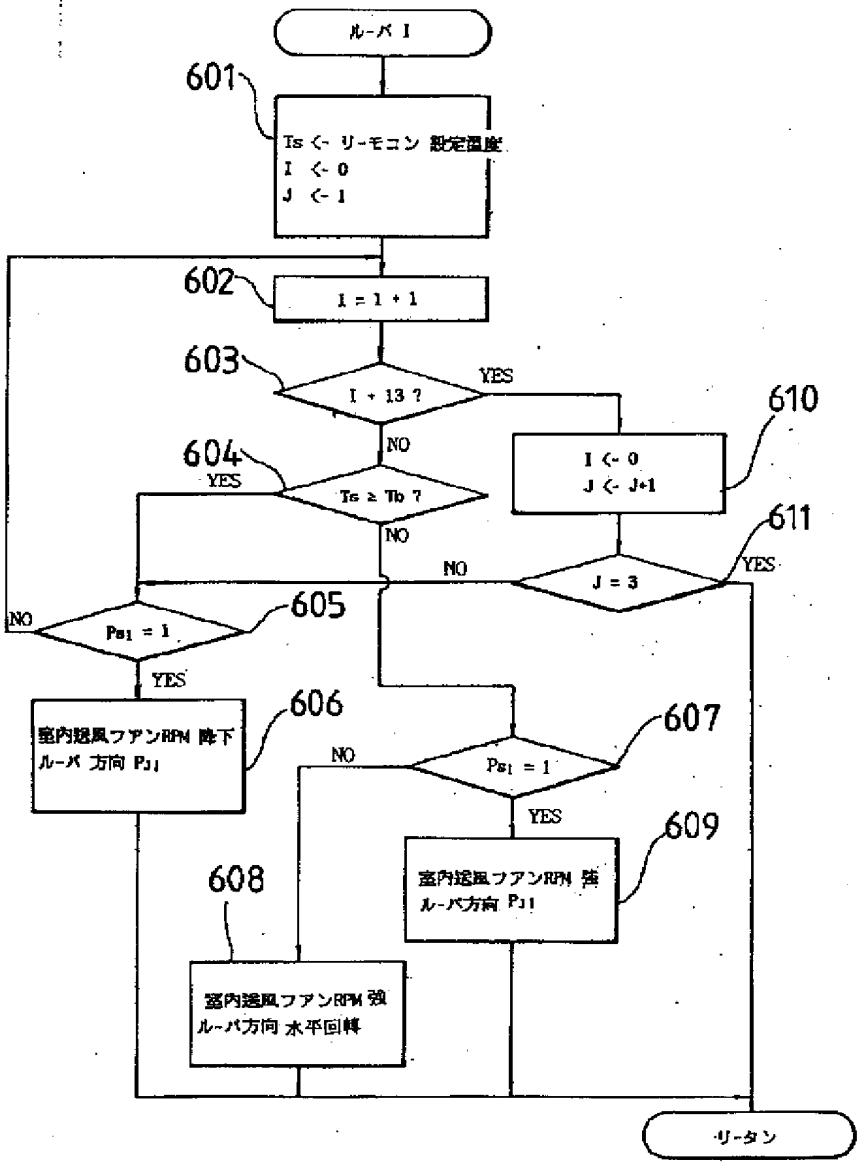
【図８】


リセット
501
監視タイマ(T1)<- 1
カウンタ　<- 0
検出回数(J)　<- 1
502
検出領域設定(I) <- 1
503
持続タイマ(T2) <- Tc
504
T2 <- T2-1
505
目的物の
輻射信号検出Ta
室内温度検出Tb
ΔT = Ta - Tb
506
A
B
C
D

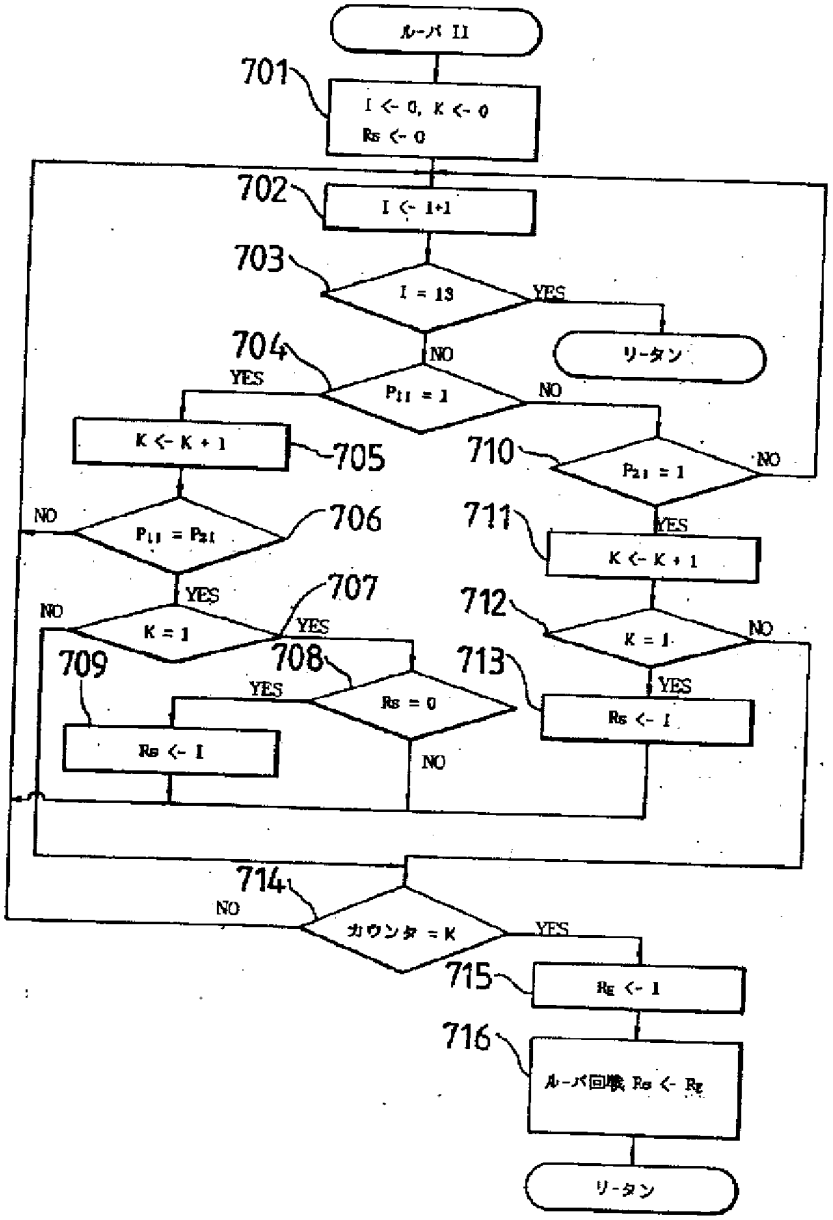
【図9】


A
507
ΔT ≥ 3 C
YES
NO
509
Ta ≥ 35 C
YES
NO
B
C
D
510
人間数(K) <--
人間数(K) + 1
人間位置確定(P
NO
T2 = 0
508
YES
511
輻射地域確定
512
I = 12 ?
YES
NO
513
I = I + 1
514
J1 = 2 ?
YES
NO
515
516
J <- J+1,
T <- T1+1
人間数(K) <- 0
NO
人間数(K) ≥ 2
YES
ループ II
ループ I

【図１０】


ルーバ I
601
Ts <- リーモコン 設定温度
I <- 0
J <- 1
602
I = I + 1
603
I = 13 ?
YES
NO
610
I <- 0
J <- J+1
604
YES
Ts ≥ Tb ?
NO
611
NO
J = 3
YES
NO
605
Ps1 = 1
YES
606
室内送風ファンRPM 降下
ルーバ 方向 Pj1
607
NO
Ps1 = 1
YES
609
室内送風ファンRPM 強
ルーバ方向 Pj1
608
室内送風ファンRPM 強
ルーバ方向 水平回転
リータン

【図１１】


ループ 11
701
I ← 0, K ← 0
Rs ← 0
702
I ← I+1
703
I = 13
YES
リータン
NO
704
YES
P11 = 1
NO
K ← K + 1
705
710
P21 = 1
NO
NO
P11 = P21
706
711
YES
K ← K + 1
NO
707
K = 1
YES
712
K = 1
NO
YES
709
708
713
YES
Rs = 0
Rs ← I
Rs ← I
NO
714
NO
カウンタ = K
YES
715
Rg ← I
716
ループ回数 Rn ← Rg
リータン